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EXAMINER	
MAYES, MELVIN C	
ART UNIT	**PAPER NUMBER**
1734	

10

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/830,493	Applicant(s) KURAMITSU ET AL.
	Examiner Melvin Curtis Mayes	Art Unit 1734

-- The MAILING DATE of this communication appears on the cover sheet with the c rrespondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 August 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-10,12-21 and 25-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,5-8,10,12-21,25-30 and 32* is/are rejected.

7)☒ Claim(s) *2,9 and 31* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Objections

(1)

Claim 29 is objected to because of the following informalities: it should read "comprises polyolefin." Appropriate correction is required.

Claim Rejections - 35 USC § 103

(2)

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

(3)

Claims 1, 5-7 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sanada et al. 4,497,677 in view of Morrisson, Jr. 4,867,935.

Sanada et al. disclose a method for manufacturing a ceramic substrate comprising: making green sheets of ceramic powder and organic binder; pressing and heating each of the green sheets to a temperature and pressure to effect dimensional stabilization of said green sheets; forming a conductor on the surface of each of the green sheets by printing paste-like conductor; laminating the green sheets under heat and pressure; and sintering the laminated green sheets. During heating and pressing to effect dimensional stabilization, uniform compaction of the green sheet composition is performed and the green sheet composition is packed more densely. The pressure and temperature used in the laminating process should be higher than those used for the dimensional stabilization treatment. The temperature during

dimensional stabilization allows sufficient softening of the organic binder in the green sheets (col. 1-col. 4). Sanada et al. does not disclose that the green sheets have a porosity of less than 50% after the step of pressing.

Morrisson, Jr. teaches that in preparing green tape (green sheet) for making a multilayer electronic substrate, acceptable cast green tapes should have a density of at least 70% of theoretical, i.e., not more than 30% open porosity (col. 9, lines 2-4).

It would have been obvious to one of ordinary skill in the art to have modified the method of Sanada et al. for making a ceramic substrate by making the green sheets to have a porosity of not more than 30%, as taught by Morrisson, Jr., as acceptable cast green tape (green sheet) for making a multilayer electronic substrate. By providing cast green sheets of porosity of less than 30% for subsequent pressing for dimensional stabilization in the method of Sanada et al., the green sheets would obviously have a porosity less than 50%, or less than 20%, after the step of pressing, as claimed in Claim 1 and Claim 25.

Further by heating and pressing during dimensional stabilization treatment such that the green sheet composition is packed more densely, a reduction of porosity of the green sheet (ceramic sheet) by applying a pressing force is obviously performed, as claimed in Claim 1.

Further by heating during dimensional stabilization to a temperature which allows sufficient softening of the organic binder in the green sheets, heat treatment during dimensional stabilization is obviously carried out at a temperature between the glass transition temperature and melting point of an organic material contained in the green sheet, as claimed in Claim 7.

(4)

Claims 3, 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above, and further in view of Chiao 5,540,884.

Chiao teaches that organic binders in green ceramic green sheets should promote preparation of flexible green sheets and readily pyrolyze without leaving an undesirably high level of residual carbon. Chiao teaches that organic binders which provide satisfactory results include polyethylene (col. 4, lines 1-15).

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined for making a ceramic substrate by providing the organic binder in the green sheets as polyethylene, as taught by Chiao, as an organic binder for green sheets which provides satisfactory results of promoting preparation of flexible green sheets and readily pyrolyzing without leaving an undesirably high level of residual carbon.

(5)

Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above, and further in view of Breton et al. 4,194,040.

Breton et al. teach that a sheet of high green strength and low moduli of elasticity of a sinterable ingredient such as ceramic particulate which can be shaped and sintered for use in making articles such as electronic components such as a capacitor is made by providing a matrix of fibrillated polytetrafluoroethylene interconnecting and entrapping a high volume, at least 85%, of the sinterable particulate. Breton et al. teach that the matrix of fibrillated polytetrafluoroethylene is a three-dimensional cobweb-like structure or non-woven mat of

intertwined fibrils which interconnect and entrap the individual particles of the sinterable particulate (col. 1-14).

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined for making a ceramic substrate by providing the green sheets as made of a matrix of fibrillated polytetrafluoroethylene interconnecting and entrapping a high volume of the ceramic particulate, as taught by Breton et al., for making a sheet of high green strength and low moduli of elasticity of a sinterable ingredient which can be shaped and sintered for use in making articles such as electronic components. By forming the green sheets of a matrix of fibrillated polytetrafluoroethylene interconnecting and entrapping a high volume of the sinterable ceramic particulate, the green sheets have an organic material arranged horizontally in a mesh-like structure and the organic material and ceramic powder are arranged horizontally in a mesh-like structure and at random in the thickness direction, because Breton et al. disclose that the matrix of fibrillated polytetrafluoroethylene is a three-dimensional cobweb-like structure or non-woven mat of intertwined fibrils which interconnect and entrap the individual particles of the sinterable particulate.

(6)

Claims 1, 5-8, 12-14, 16, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 9-237955 in view of Morrisson, Jr. 4,867,935 and Sanada et al. 4,497,677.

JP 9-237955 discloses a method of making a laminated part such as a capacitor from green sheets comprising: providing a green sheet; providing a conductor film pattern printed on a release film; laying the printed film on the green sheet to transfer the conductor film pattern by hot pressure; stripping the release film; laminating green sheets; and firing (Abstract and

computer translation). JP 9-237955 does not disclose pressing the green sheets to make a reduction in porosity before transferring the conductor film pattern or disclose that the green sheets have a porosity of less than 50% after the step of pressing.

Morrisson, Jr. teaches that in preparing green tape (green sheet) for making a multilayer electronic substrate, acceptable cast green tapes should have a density of at least 70% of theoretical, i.e., not more than 30% open porosity (col. 9, lines 2-4).

Sanada et al. teach that in manufacturing a ceramic substrate from laminating ceramic green sheets, to minimize dimensional change of the green sheets, before the green sheets are provided with conductor paste, the green sheets are each pressed under temperature to remove residual stress and remaining solvents in the green sheet as well as perform uniform compaction of the green sheet composition and at temperature to allow softening of the organic binder in the green sheet with the result that the composition is sufficiently homogenized and packed more densely. Sanada et al. teach that the pressure and temperature for hot pressing in the lamination of the green sheets should be higher than those used for dimensional stabilization in order to embed the conductor layer, too high a pressure during dimensional stabilization packing the sheet to densely to allow the elimination of binder during sintering (col. 2, line 1 – col. 4, line 5).

It would have been obvious to one of ordinary skill in the art to have modified the method of JP 9-237955 for making a laminated ceramic capacitor by pressing each individual green sheet under heat and pressure before providing the green sheets with conductor film patterns, as taught by Sanada et al., to minimize dimensional change of the green sheets sheets. By pressing each green sheet under heat and pressure for dimensional stabilization to remove residual stress and remaining solvents in the green sheet as well as perform uniform compaction

of the green sheet composition and allow softening of the organic binder in the green sheet with the result that the composition is sufficiently homogenized and packed more densely, as taught by Sanada et al., each green sheet is obviously pressed making a reduction of porosity in the ceramic sheet, as claimed.

It would have been obvious to one of ordinary skill in the art to have further modified the method of JP 9-237955 by making the green sheets to have a porosity of not more than 30%, as taught by Morrisson, Jr., as acceptable cast green tape (green sheet) for making a multilayer electronic substrate. By providing cast green sheets of porosity of less than 30% for subsequent pressing for dimensional stabilization, as taught by Sanada et al., the green sheets would obviously have a porosity less than 50%, or less than 20%, after the step of pressing, as claimed in Claims 1, 8, 25 and 26.

Applying the pressure during dimensional stabilization as less than the pressure applied during laminating the green sheets, as claimed in Claims 5 and 12, would have been obvious to one of ordinary skill in the art; as taught by Sanada et al., because the pressure and temperature for hot pressing in the lamination of the green sheets should be higher than those used for dimensional stabilization to embed the conductor layer, too high a pressure during dimensional stabilization packing the sheet to densely to allow the elimination of binder during sintering.

Heating the ceramic sheet during dimensional stabilization to a temperature between the glass transition temperature and melting point of an organic material contained in the green sheet, as claimed in Claim 7 and 14, would have been obvious to one of ordinary skill in the art, as taught by Sanada et al., to heat the ceramic sheet to a temperature which allows sufficient

softening of the organic binder in the green sheets with the result that the composition is sufficiently homogenized and packed more densely.

(7)

Claims 3, 10, 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 1 and 8 above, and further in view of Chiao 5,540,884.

Chiao teaches that organic binders in green ceramic green sheets should promote preparation of flexible green sheets and readily pyrolyze without leaving an undesirably high level of residual carbon. Chiao teaches that organic binders which provide satisfactory results include polyethylene (col. 4, lines 1-15).

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined by providing the organic binder in the green sheets as polyethylene, as taught by Chiao, as an organic binder for green sheets which provides satisfactory results of promoting preparation of flexible green sheets and readily pyrolyzing without leaving an undesirably high level of residual carbon.

(8)

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 8 above, and further in view of Kondo et al.

Kondo et al. teach that conductor paste for multilayer substrates made from green sheets comprises 10 parts by weight binder for 100 parts by weight of metal powder (col. 4, lines 12-21).

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined by providing the metal paste for forming the conductor

film patterns as 10 wt% binder for 100 wt% metal powder, encompassed by the range as claimed, as taught by Kondo et al., for conductor paste used to make multilayer substrates from green sheets.

(9)

Claims 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 1 and 8 above, and further in view of Breton et al. 4,194,040.

Breton et al. teach that a sheet of high green strength and low moduli of elasticity of a sinterable ingredient such as ceramic particulate which can be shaped and sintered for use in making articles such as electronic components such as a capacitor is made by providing a matrix of fibrillated polytetrafluoroethylene interconnecting and entrapping a high volume, at least 85%, of the sinterable particulate. Breton et al. teach that the matrix of fibrillated polytetrafluoroethylene is a three-dimensional cobweb-like structure or non-woven mat of intertwined fibrils which interconnect and entrap the individual particles of the sinterable particulate (col. 1-14).

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined for making a laminated capacitor by providing the green sheets as made of a matrix of fibrillated polytetrafluoroethylene interconnecting and entrapping a high volume of the ceramic particulate, as taught by Breton et al., for making a sheet of high green strength and low moduli of elasticity of a sinterable ingredient which can be shaped and sintered for use in making articles such as electronic components such as a capacitor. By forming the green sheets of a matrix of fibrillated polytetrafluoroethylene interconnecting and entrapping a high volume of the sinterable ceramic particulate, the green sheets have an organic material

arranged horizontally in a mesh-like structure and the organic material and ceramic powder are arranged horizontally in a mesh-like structure and at random in the thickness direction, because Breton et al. disclose that the matrix of fibrillated polytetrafluoroethylene is a three-dimensional cobweb-like structure or non-woven mat of intertwined fibrils which interconnect and entrap the individual particles of the sinterable particulate.

(10)

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Breton et al. 4,194,040.

Breton et al. disclose a method of making a capacitor comprising: intercalating layers of dielectric material between conductor layers. Breton et al. disclose that the layers are made by providing a matrix of fibrillated polytetrafluoroethylene interconnecting and entrapping a high volume, at least 85%, of a particulate of a sinterable material such as metal or ceramic. Breton et al. disclose that metal and ceramic articles can be sintered. Breton et al. disclose that the matrix of fibrillated polytetrafluoroethylene is a three-dimensional cobweb-like structure or non-woven mat of intertwined fibrils which interconnect and entrap the individual particles of the sinterable particulate (col. 1-14).

By forming the layers of dielectric material and conductor layers of a matrix of fibrillated polytetrafluoroethylene interconnecting and entrapping a high volume of a sinterable particulate of ceramic and metal, respectively, the layers of dielectric material have an organic material arranged horizontally in a mesh-like structure and the organic material and ceramic powder are arranged horizontally in a mesh-like structure and at random in the thickness direction, because Breton et al. disclose that the matrix of fibrillated polytetrafluoroethylene is a three-dimensional

cobweb-like structure or non-woven mat of intertwined fibrils which interconnect and entrap the individual particles of the sinterable particulate.

(11)

Claims 17 and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mandai et al. in view of Breton et al. 4,194,040.

Mandai et al. disclose a method of manufacturing a laminated ceramic electronic component such as capacitor comprising: providing internal electrodes on a back film by a thin film forming method; transferring the electrodes to green sheets from the back film; stacking green sheets; and baking (col. 2-4). Mandai et al. do not disclose the green sheets having organic material arranged horizontally in a mesh-like structure and the organic material and ceramic powder are arranged horizontally in a mesh-like structure and at random in the thickness direction.

Breton et al. teach that a sheet of high green strength and low moduli of elasticity of a sinterable ingredient such as ceramic particulate which can be shaped and sintered for use in making articles such as electronic components such as a capacitor is made by providing a matrix of fibrillated polytetrafluoroethylene interconnecting and entrapping a high volume, at least 85%, of the sinterable particulate. Breton et al. teach that the matrix of fibrillated polytetrafluoroethylene is a three-dimensional cobweb-like structure or non-woven mat of intertwined fibrils which interconnect and entrap the individual particles of the sinterable particulate (col. 1-14).

It would have been obvious to one of ordinary skill in the art to have modified the method of Mandai et al. for making a laminated capacitor of electrodes and ceramic green sheets

by providing the green sheets as made of a matrix of fibrillated polytetrafluoroethylene interconnecting and entrapping a high volume of the ceramic particulate, as taught by Breton et al., for making a sheet of high green strength and low moduli of elasticity of a sinterable ingredient which can be shaped and sintered for use in making articles such as electronic components such as a capacitor. By forming the green sheets of a matrix of fibrillated polytetrafluoroethylene interconnecting and entrapping a high volume of the sinterable ceramic particulate, the green sheets have an organic material arranged horizontally in a mesh-like structure and the organic material and ceramic powder are arranged horizontally in a mesh-like structure and at random in the thickness direction, because Breton et al. disclose that the matrix of fibrillated polytetrafluoroethylene is a three-dimensional cobweb-like structure or non-woven mat of intertwined fibrils which interconnect and entrap the individual particles of the sinterable particulate.

(12)

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 17 above, and further in view of Morrisson, Jr.

Morrisson, Jr. teaches that in preparing green tape (green sheet) for making a multilayer electronic substrate, acceptable cast green tapes should have a density of at least 70% of theoretical, i.e., not more than 30% open porosity (col. 9, lines 2-4).

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined for making a laminated capacitor by making the green sheets to have a porosity of not more than 30%, as taught by Morrisson, Jr., as acceptable cast green tape (green sheet) for making a multilayer electronic substrate.

(13)

Claims 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 9-237955 in view of Sanada et al. 4,497,677 and Kawabata et al. 5,019,200.

JP 9-237955 discloses a method of making a laminated part such as a capacitor from green sheets comprising: providing a green sheet; providing a conductor film pattern printed on a release film; laying the printed film on the green sheet to transfer the conductor film pattern by hot pressure; stripping the release film; laminating green sheets; and firing (Abstract and computer translation). JP 9-237955 does not disclose pressing the green sheets to make a reduction in porosity before transferring the conductor film pattern or disclose sandwiching the green sheets having conductor film pattern with dummy layers (green sheets without conductor film pattern).

Sanada et al. teach that in manufacturing a ceramic substrate from laminating ceramic green sheets, to minimize dimensional change of the green sheets, before the green sheets are provided with conductor paste, the green sheets are each pressed under temperature to remove residual stress and remaining solvents in the green sheet as well as perform uniform compaction of the green sheet composition and at temperature to allow softening of the organic binder in the green sheet with the result that the composition is sufficiently homogenized and packed more densely (col. 2, line 1 – col. 4, line 5).

Kawabata et al. teach that in making a multilayer capacitor from green sheets, dummy green sheets not coated with electrode paste are laminated with green sheets coated with electrode paste so as to be laminated on the upper and lower side of the laminated body (col. 4, lines 11-27).

It would have been obvious to one of ordinary skill in the art to have modified the method of JP 9-237955 for making a laminated ceramic capacitor by pressing each individual green sheet under heat and pressure before providing the green sheets with conductor film patterns, as taught by Sanada et al., to minimize dimensional change of the green sheets. By pressing each green sheet under heat and pressure for dimensional stabilization to remove residual stress and remaining solvents in the green sheet as well as perform uniform compaction of the green sheet composition and allow softening of the organic binder in the green sheet with the result that the composition is sufficiently homogenized and packed more densely, as taught by Sanada et al., each green sheet is obviously pressed making a reduction of porosity in the ceramic sheet, as claimed.

It would have been obvious to one of ordinary skill in the art to have further modified the method of JP 9-237955 for making a laminated capacitor by laminating the green sheets having conductor film pattern between green sheets having no conductor film (dummy layers), as taught by Kawabata et al., to provide the upper and lower side of a laminated capacitor body with green sheets not coated with electrode paste. Laminating dummy layer green sheets having no conductor film to sandwich the green sheets having conductor film to form a capacitor would have been obvious to one of ordinary skill in the art, as suggested by Kawabata et al.

Allowable Subject Matter

(14)

Claims 2, 9 and 31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

(15)

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

As set forth in the rejections, Morrisson et al. teach that acceptable cast green tapes for multilayer electronic substrates should no more than 30% porosity. Such green sheets of less than 30% porosity which are to be subjected to pressing for dimensional stabilization, as taught by Sanada et al., would thus obviously have less than 50% porosity after the step of pressing.

In the previous Office Action, it was indicated that the claims would be allowable if amended to include the limitation that the ceramic sheets are formed of polyethylene fibers. This was omitted from Claim 17 as amended.

Conclusion

(16)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melvin Curtis Mayes whose telephone number is 703-308-1977. The examiner can normally be reached on Mon-Fri 7:00 AM - 3:30 PM.

After December 22nd, the Examiner can be reached at telephone number 571-272-1234 and rightfax number 571-273-1234.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on 703-308-3853. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Melvin Curtis Mayes
Primary Examiner
Art Unit 1734

MCM